Message

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Sent: 1/28/2019 12:06:09 AM
To: J. Wesley Hawthorne [hawthornej@locustec.com]
CC: 'gcook@valleywater.org' [gcook@valleywater.org]; 'Lynne Kilpatrick' [lkilpatrick@sunnyvale.ca.gov]; 'Heather O'Cleirigh (Heather.OCleirigh@amd.com)' [Heather.OCleirigh@amd.com]; 'Shantal Der Boghosian' [shantal.derboghosian@ngc.com]; Nancy-Jeanne LeFevre [LeFevren@locustec.com]; Shaffer, Caleb [Shaffer.Caleb@epa.gov]; Barker, Shau-Luen (ShauLuen.Barker@philips.com) [ShauLuen.Barker@philips.com]
Subject: RE: EPA Comments - Five-Year Status Report and Remedial Effectiveness Evaluation 2011 to 2015 for the Signetics Site - 811 East Arques Avenue, Sunnyvale, CA

Hello Wes,

Thank you for submitting this letter. I will review and respond as soon as I can.

Sincerely,

Melanie

From: J. Wesley Hawthorne <hawthornej@locustec.com>
Sent: Friday, January 25, 2019 3:52 PM
To: MORASH, MELANIE <morash.melanie@epa.gov>
Cc: 'gcook@valleywater.org' <gcook@valleywater.org>; 'Lynne Kilpatrick' <lkilpatrick@sunnyvale.ca.gov>; 'Heather O'Cleirigh (Heather.OCleirigh@amd.com)' <Heather.OCleirigh@amd.com>; 'Shantal Der Boghosian' <shantal.derboghosian@ngc.com>; Nancy-Jeanne LeFevre <LeFevren@locustec.com>; Shaffer, Caleb <Shaffer.Caleb@epa.gov>; Stralka, Daniel <Stralka.Daniel@epa.gov>; Plate, Mathew <Plate.Mathew@epa.gov>; Barker, Shau-Luen (ShauLuen.Barker@philips.com) <ShauLuen.Barker@philips.com>
Subject: RE: EPA Comments - Five-Year Status Report and Remedial Effectiveness Evaluation 2011 to 2015 for the Signetics Site - 811 East Arques Avenue, Sunnyvale, CA

Melanie:

Per our discussion on 17 October, please find attached a response-to-comments letter for the 811 East Arques Avenue five-year status report for 2011-2015. Please let me know if you have any further comments.

Thank you,

J. Wesley Hawthorne, PE, PG
President
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email: hawthornej@locustec.com

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From: MORASH, MELANIE <morash.melanie@epa.gov>
Sent: Tuesday, September 18, 2018 5:28 PM
To: J. Wesley Hawthorne <hawthornej@locustec.com>; Nancy-Jeanne LeFevre <LeFevren@locustec.com>
Cc: Shau Luen Barker <shauluen.barker@philips.com>; gcook@valleywater.org; Lynne Kilpatrick <lkilpatrick@sunnyvale.ca.gov>; Heather O'Cleirigh (Heather.OCleirigh@amd.com) <Heather.OCleirigh@amd.com>; Rebecca Mora <rebecca.mora@aecom.com>; Shantal Der Boghosian <shantal.derboghosian@ngc.com>; Calhoun, Michael <MCalhoun@haleyaldrich.com>; Stralka, Daniel <Stralka.Daniel@epa.gov>; Plate, Mathew <Plate.Mathew@epa.gov>; manheimer, kelly <manheimer.kelly@epa.gov>
Subject: EPA Comments - Five-Year Status Report and Remedial Effectiveness Evaluation 2011 to 2015 for the Signetics Site - 811 East Arques Avenue, Sunnyvale, CA

Dear Wes and Nancy-Jeanne,

Thank you for submitting the *Five-Year Status Report and Remedial Effectiveness Evaluation 2011 to 2015, 811 East Arques, Sunnyvale, California* (Report) on behalf of Philips Semiconductors, Inc. for the Signetics Site in Sunnyvale, California. The report submission is required for compliance with Regional Water Quality Control Board Order 91-104 (Order), which remains in effect subsequent to the lead-agency transfer from the State to EPA in August 2014. The Report describes remediation activities conducted during the 2011 to 2015 reporting period and evaluates the effectiveness of the remedial actions.

EPA appreciates your continued operation and monitoring of the groundwater extraction and treatment system for the Signetics Site, in compliance with the Order. The following set of comments are being provided for your consideration during the period of "stop-work" for the Offsite Operable Unit (OOU) vapor intrusion (VI) effort and Signetics in-situ bioremediation (ISB) study. We recognize that this is a substantial set of feedback, and appreciate your consideration of these items. Please provide a response-to-comments letter and updated Report by **Friday, January 25, 2019**. If this timeframe is not feasible, please identify an alternate submittal date to EPA for approval by Friday, September 28, 2018.

1.0 GENERAL COMMENTS

1. The Report was submitted in accordance with Provision C.41, Task 11 of the Order. Remedial action objectives (RAOs) were not presented or discussed from which remedial progress can be evaluated. Please revise the Report to address RAOs. Accordingly, remediation effectiveness is inferred to be evaluated with reference to regulatory levels associated with potential human health risk resulting from ingestion of groundwater (Maximum Contaminant Levels [MCLs]). VI is recognized as a primary potential human health risk during the 2011-2015 reporting period, yet VI criteria were not incorporated into evaluation of remedial effectiveness. Please revise the Report to incorporate VI criteria in the evaluation.

2. The evaluation of remedial effectiveness at the Signetics Site should be restricted to data generated on, or immediately adjacent to, the Signetics Site. Data generated from wells far removed from the Signetics Site are not appropriate for evaluation of the Signetics Site. In addition, site boundaries should be depicted in the report figures. Please revise the Report to address these items.

3. The evaluation of remedial effectiveness should include detailed discussions of progress towards RAOs. The duration of the groundwater remedy outlined in the Order was 24 years to attain remediation goals in groundwater beneath the Signetics Site, which have been surpassed by cleanup operations without attainment of goals. The recommendation to evaluate enhanced anaerobic biodegradation as a remedy is not justified on

the basis of the remedial effectiveness results presented in the Report that indicate the vertical hydraulic gradients are acceptable, capture zones are adequate, the mass removal rate is steady, trichloroethene (TCE) concentrations in groundwater are decreasing, and plume boundaries are stable (see the following comments). Please revise the Report to add robustness to the discussion of ISB as a potential remedy change by expanding upon the discussions of vertical hydraulic gradients, capture zones, mass removal rates, concentration trends, and shifts in plume boundaries.

4. The Field Sampling and Analysis Guidance Manual (The Gauntlett Group, 1998) should be updated to account for changes in sampling protocol and laboratory analysis during the past 20 years, and provide updated RAOs to include potential VI concerns against which effectiveness can be compared.

2.0 SPECIFIC COMMENTS

1. Section 2.4, Page 4, First Paragraph – The stratigraphic information presented in the Report references cross-sections generated over 20 years ago. The complexities of the various hydrostratigraphic units are not addressed. Understanding of the subsurface geology/hydrogeology is critical in understanding sources, residual sources, and migration pathways of contaminants that must be addressed to evaluate remedial effectiveness. Recent environmental stratigraphic studies generated at adjacent sites significantly affect the interpretation of deposits adjacent to, and beneath, the Signetics Site. The section on site hydrogeology should include an updated hydrogeologic discussion with reference to coarse-gained sediment preferred pathways and possible fine-grained residual sources and the results incorporated into subsequent discussions. Please revise the Report to address these issues.

2. Section 2.5.2, Page 5, Second Paragraph – The text in the Report states that groundwater monitoring is conducted to monitor remedial effectiveness and containment of the contaminant plume. Reduction in potential human health risk is critical in evaluating remedial effectiveness. In addition to the discussion on public water supply aquifers, please revise the Report to include potential VI concerns related to chemicals in groundwater.

3. Section 3.1.2, Page 7 – This section of the Report provides a good description of the actions taken to address contaminants in the vadose zone by soil vapor extraction or dual-purpose extraction. Critical to the evaluation of the success of the vadose zone remedy is total mass removed and estimates of residual mass. Please revise the Report to provide estimates of these parameters.

4. Section 3.3, Page 11, First paragraph – Monitoring procedures, sampling procedures, and quality assurance/quality control objectives as referenced in the Field Sampling and Analysis Guidance Manual (The Gauntlett Group, 1998) should be updated to current standards with reference to current RAOs.

5. Section 3.3, Page 12, First Paragraph – The text in this section states that groundwater levels are monitored annually at 111 monitoring and extraction wells at the Signetics Site as detailed in Table 3-2. However, numerous wells listed in Table 3-2 are far removed from the Signetics Site and should not be included in the Report. Please revise the well list to include only those wells on, or immediately adjacent to, the Signetics Site.

6. Section 4, Page 14, First Paragraph (and Figures 4-1 through 4-4) – Please revise the vertical gradient analysis in the Report to use only those wells on, or immediately adjacent to, the Signetics Site.

7. Section 4, Pages 14 and 15 (and Tables 4-1 through 4-5) – The data used to evaluate the vertical gradient for the "A", "B2", and "B4" aquifers in 2011 are from 2010 (Table 4-1). Similarly, for these aquifers, data presented in Tables 4-2 to 4-4 for 2012 through 2014 are not for the reporting periods. No data for 2015 was

reported for these wells in Table 4-5. Please provide revised data consistent with the 2011 to 2015 reporting period.

8. Section 4.1, Page 14, First Paragraph – The assertion that it is generally desirable for vertical hydraulic gradient to flow from a lower concentration to a high concentration is not valid for shallow groundwater that is potentially of VI concern. The vertical gradient evaluation should account for a reduction in concentration that may affect human health risk. An upward gradient in the two shallow hydrostratigraphic in areas where the "B1" aquifer exceeds Vapor Intrusion Screening Levels (VISLs) will not result in mitigating the source of VI concerns from the TCE-impacted "A" aquifer. Unilaterally, a downward vertical gradient is preferable for any portion of the "A" aquifer that contains contaminants above the VISL. Please revise the Report accordingly to account for potential VI concerns in the vertical gradient evaluation in shallow aquifers.

9. Section 4.1, Page 15, First Paragraph – The text in the Report states that *the direction of vertical gradient across the "A/B" aquitard is not of significant concern*. Onsite wells S003A, S082A, and S157A are located in areas where the groundwater concentration of TCE in the "A" aquifer exceeds the commercial VISL for TCE and they exhibited an upward gradient during the reporting period. Also during the reporting period, the groundwater remedy has not significantly reduced concentrations in these three wells, and subsequently not reduced the potential VI concerns in these areas. Please revise the evaluation to address remedial effectiveness in relation to persistent elevated TCE concentrations as they relate to potential VI concerns.

10. Section 4.2, Page 15, First Paragraph – The capture zone figures referenced in Appendix C are based upon data generated up to 4,000 feet distance from the Signetics Site. A more detailed graphic presentation of the capture zone analysis of the Signetics Site is warranted. In addition, as stated in the Order, one of the primary purposes of the implemented groundwater remedy was *to control migration of polluted groundwater from the OU*. Please revise the Report to address the effectiveness of downgradient control in the various hydrostratigraphic units in the capture zone evaluation and potential changes in extraction rates.

11. Section 4.4, Page18, First Paragraph – In regards to concentration trends, please use only data generated on, or adjacent to, the Signetics Site and revise the discussion and data presented in Tables 4-7 and 4-8.

12. Section 4.4.1, Page 18, First Paragraph – The data presented show a significant reduction in the geometric mean of the "A" aquifer since inception of the groundwater remedy in onsite wells. However, the decrease in average geometric mean concentration of TCE during the reporting period appears to be leveling off during the reporting period and may be approaching asymptoticlevels significantly above the commercial VISL. A subsequent discussion is warranted as to the remedial effectiveness and time period to achieve levels protective of VI concerns and MCLs, especially since the remedy has operated longer than initially scheduled. Please revise the Report accordingly.

13. Section 4.4.2, Page 19, First Paragraph – Although not as dramatic as in the "A" aquifer, the decrease in geometric mean concentration of the "B1" aquifer also appears to be leveling off during the reporting period. A subsequent discussion is warranted as to the timeframe to achieve MCL cleanup goals and possible affects to the "A" aquifer TCE concentrations from an upward vertical gradient from TCE-impacted "B1" groundwater. Please revise the Report accordingly.

14. Section 4.4.6, Page 20 – The previously discussed issues with the trends in concentration evaluation should be specifically addressed and summarized as they relate to remedial effectiveness during the reporting period.

15. Section 4.5, Page 20, First Paragraph – As stated in the text, the plume boundary discussion relates only to the Signetics Site. Accordingly, the figures presented in Appendix D should correspond to the text and address the Signetics Site and not the entire offsite plume. Please revise the figures in the Report to be consistent with the text.

16. Section 4.5.1, Page 20, First Paragraph (and Figures D-1 through D-5) – The 0.005 milligram per liter (mg/L) contour should be dashed at all places where no outlying data constrain plume contours in the "A" aquifer. Specifically, the 0.005 mg/L contour near well S033A is not constrained to west or to the north of well 29-S. In addition to the benefit of depicting the regulatory value (0.005 mg/L) extent of the TCE MCL on the "A" aquifer figures, the extent of groundwater exceeding the commercial VISL of 7.4 micrograms per liter (EPA, 2014) should be represented on the figures and discussed in the text. Please revise the Report accordingly.

17. Section 4.5.2, Page 21, First Paragraph (and Figures D-7 through D-10) – The 0.005 mg/L contour for the "B1" aquifer should be consistently dashed north of wells 52-D and 29-D as no constraining data are present outboard of these wells. Please revise the Report accordingly, and also discuss the lack of constraining data.

18. Section 4.5.3, Page 21, First Paragraph (and figures D-11 through D-15) – No "B3" wells are present in the central, western, and southern portion of the Signetics Site to constrain the extent of the TCE plume. Such uncertainty should be expressed in the contours by a dash for the 0.01 mg/L contour and question marks along the 0.005 mg/L contour. Uncertainty in plume boundaries should be discussed in the text. Please revise the Report and figures accordingly.

19. Section 4.5.4, Page 21, First Paragraph (and Figures D-16, D- 17, D-19, and D-20) – The extent of the "B4" TCE plume is not constrained by data south and west of well S154B3, a fact that should be reflected as a dash in the 0.005 mg/L TCE contour. In addition, the extent of the 0.005 mg/L TCE contour around well S154B3 is incorrectly placed north of this well. Uncertainty in plume boundaries should be discussed in the text. Please revise the Report and figures accordingly.

20. Section 4.6, Page 21 – The evaluation of alternative remedial options with the selection of enhanced anaerobic biodegradation is not justified on the basis of the report content indicating the vertical gradients are acceptable, the capture zones are adequate, the TCE plumes are stable, the mass removal is acceptable, and the TCE concentrations in various aquifers continue to decrease. Please see General Comment #3.

21. Section 5.1, Page 23 – The results of the remedial effectiveness evaluation should be revised to incorporate concerns expressed in the above comments.

22. Section 5.2, Page 23 – Recommendations and modification to the remedial program should include actions to reduce the potential VI concerns in the "A" aquifer, reduce migration of impacted groundwater offsite, and provide a revised schedule of remedial activities and completion. Please revise the Report accordingly.

Regards,

Melanie Morash

Melanie Morash, Project Manager
California Site Cleanup Section I, Superfund Division

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References

Dames & Moore, 1996, *Five-Year Status Report and Remedial Effectiveness Evaluation, 811 East Arques, Sunnyvale, California,* September 13.

EPA, 2014, *Fourth Five-Year Review Report for Advanced Micro Devices 901/902 & TRW Microwave Superfund Sites, Includes the "Companies Offsite Operable Unit", Santa Clara County, California,* September

The Gauntlett Group, LLC, 1998, *Field Sampling and Analysis Guidance Manual, Philips Semiconductors, 811 East Arques Site*, January.

Locus Technologies, 2016, *Five-Year Status Report and Remedial Effectiveness Evaluation 2011 to 2015, 811 East Arques, Sunnyvale, California,* June.